Pre-Calculus

Name: KEY

Unit 7 Review

Remember to study your notes, old homework, and your quiz.

Use the following information for #1-4.

$$f(x)=x^2-10x+7 \qquad g(x)=x^3-4x-13$$

1. Find f(x + 1)

$(x+1)^2-10(x+1)+7$ FOIL

x^2-8x-2

2. find g(-4)

$(-4)^3-4(-4)-13$

-61

3. Find f(2)

$(2)^2-10(2)+7$

-9

4. Find g(a)

$a^3-4a-13$

$a^3-4a-13$

5. Write the equation of the line that is the perpendicular bisector of the line segment containing the points (6, 2) and (-1, 5).

$m=\frac{5-2}{-1-6}=\frac{3}{-7}$ $\perp m=\frac{7}{3}$ $x_1\ y_1$ $x_2\ y_2$

midpoint $\left(\frac{6+-1}{2},\frac{2+5}{2}\right)\Rightarrow(5/2,7/2)$

EQUATION

$y-\frac{7}{2}=\frac{7}{3}(x-\frac{5}{2})$

$y=\frac{7}{3}x-\frac{7}{3}$

For #6-7, describe the transformations of the graph from $f(x)=x^2$.

6. $f(x)=\frac{1}{2}(x+1)^2-7$

- Left 1 unit
- Down 7 units
- stretch

7. $f(x)=-3(x-2)^2+4$

- Reflection
- compression
- Right 2units
- UP 4units

Use the following function for # 8-11.

$f(x)=3x^2-5$ $\quad g(x)=x^2-4$ $\quad h(x)=\frac{1}{2x-5}$

Write the following functions in simplified form.

8. $f+g$

$(3x^2-5)+(x^2-4)$

$4x^2-9$

9. $f-g$

$(3x^2-5)-(x^2-4)$

$2x^2-1$

10. $f\cdot h$

$(3x^2-5)\left(\frac{1}{2x-5}\right)$

$\frac{3x^2-5}{2x-5}$

11. $\frac{g}{h}=\frac{x^2-4}{\frac{1}{2x-5}}$

$\frac{x^2-4}{1}\cdot\frac{2x-5}{1}=(x^2-4)(2x-5)$

Use the following functions for # 12-17.

$f(x)=\sqrt{3x+1}$ $\quad g(x)=x-7$

Write the following functions in simplified form.

12. $f\circ g$

$f(x-7)=\sqrt{3(x-7)+1}$

$\sqrt{3x-20}$

13. $g(f(x))$

$g(\sqrt{3x+1})=\sqrt{3x+1}-7$

$\sqrt{3x+1}-7$

Evaluate each of the following:

14. g(a)

$a-7$

15. $f(x^2+5)$

$\sqrt{3(x^2+5)+1}$

$\sqrt{3x^2+16}$

16. $f(g(10)$

$f(10-7)=f(3)=$

$\sqrt{3(3)+1}=\sqrt{10}$

17. $g(f(8))$

$g(\sqrt{3(8)+1})=$

$g(\sqrt{25})=g(5)=$

$5-7=-2$

18. Find the slope of the line containing (7, -7) and (4, -2)

$x_1\ y_1 \quad x_2\ y_2$

$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{-2+7}{4-7} = \frac{5}{-3}$ **-3/5**

19. Find the slope and y-intercept of 3x -2y = 10

slope: 3/2

y-int: (0, -5)

$-3x \quad -3x$

$\frac{-2y}{-2} = \frac{-3x}{-2} + \frac{10}{-2}$

$y = \frac{3}{2}x - 5$

#20-21: Write the answer in slope-intercept form:

20. Equation of the line with slope 2/3 containing the point (-3,4)

$y - y_1 = m(x - x_1)$ m $x_1\ y_1$

$y - 4 = \frac{2}{3}(x + 3)$

$y - 4 = \frac{2}{3}x + 2$

$+4 \quad +4$

$y = \frac{2}{3}x + 6$

21. Horizontal line through (4, -5)

HOY

VUX

$y = -5$

22. What is the slope of a...

A. horizontal line?

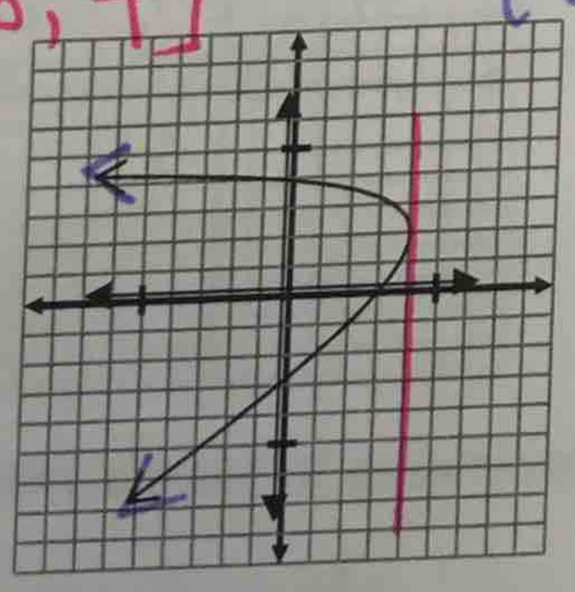
zero

B. Vertical line?

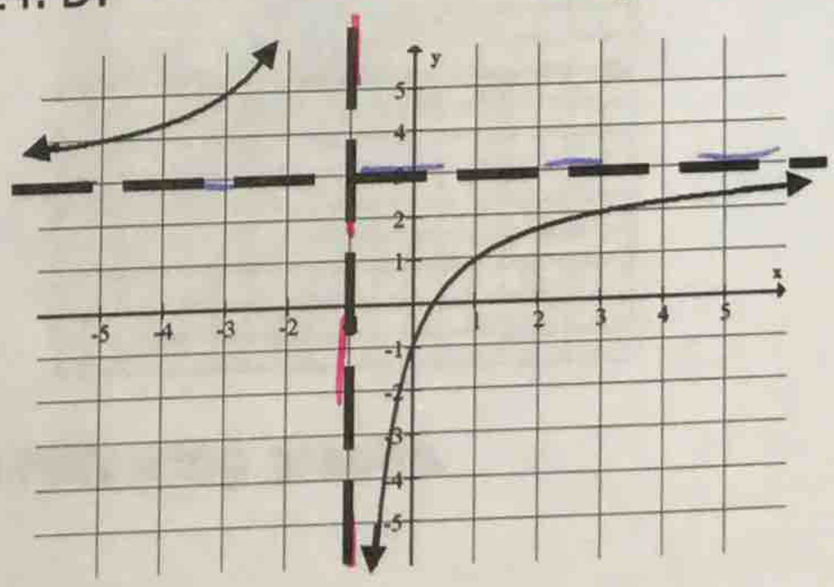
undefined

Write the domain and range in interval notation

23. D: $(-\infty, 4]$ R: $(-\infty, \infty)$



24. D: $(-\infty, -1) \cup (-1, \infty)$ R: $(-\infty, 3) \cup (3, \infty)$



Find the domain of the following functions in interval notation.

25. $f(x) = x^3 - 3x^2 + x - 1$

D: $(-\infty, \infty)$

polynomial

26. $f(x) = \frac{1}{\sqrt{2x+2}}$

D: $(-1, \infty)$

denominator $\neq 0$

square roots ≥ 0

$2x + 2 > 0$

$x > -1$

27. $f(x) = \frac{3x}{4x-1}$

D: $(-\infty, 1/4) \cup (1/4, \infty)$

denominator $\neq 0$

$4x - 1 \neq 0$

$x \neq 1/4$

Write the equation in vertex form by completing the square. List the vertex and axis of symmetry.

28. $f(x)=x^2+16x-12$ $b=16$ $\left(\frac{16}{2}\right)^2$

$(x^2+16x+\underline{64})-12-\underline{64}$

$(x+8)^2-76$

vertex: $(-8,-76)$

AoS: $x=-8$

29. $h(x)=-2x^2-12x-12$ $b=6$ $\left(\frac{6}{2}\right)^2$

$-2(x^2+6x+9)-12+18$

$-2(x+3)^2+6$

vertex: $(-3,6)$

AoS: $x=-3$

30. $y=-3x^2-24x-41$ $b=8$ $\left(\frac{8}{2}\right)^2$

$-3(x^2+8x+\underline{16})-41+\underline{48}$

$-3(x+4)^2+7$

vertex: $(-4,7)$

AoS: $x=-4$

Using the discriminant, list the number of real solutions b^2-4ac

31. $3x^2-5x+1=0$

POSITIVE TWO

32. $3x^2-8x+8=0$

NEGATIVE NONE

33. $g(x)=x^2+6x$

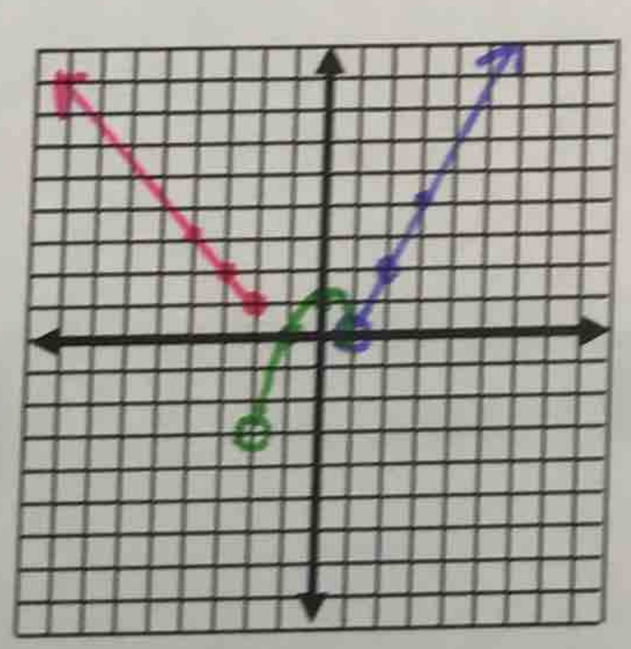
POSITIVE TWO

34. $r(x)=x^2+x+1$

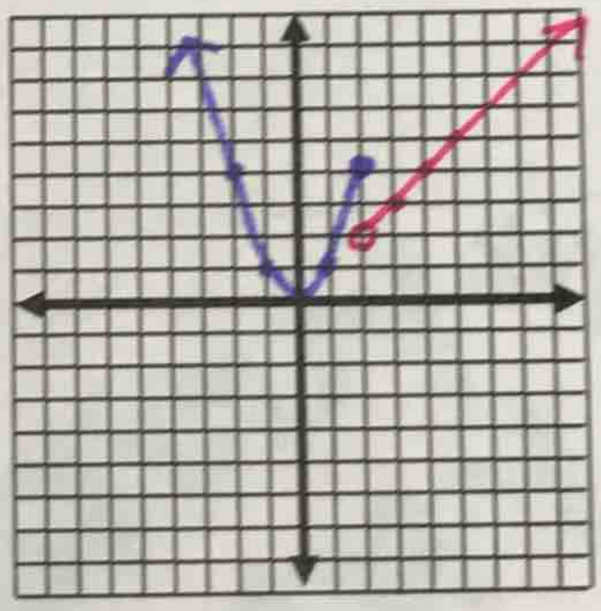
NEGATIVE NONE

#35-36: Sketch a graph of the following piecewise functions.

35. $y=\begin{cases}2x-2, & x>1\\ -x^2+1, & -2<x\le 1\\ -x-1, & x\le -2\end{cases}$

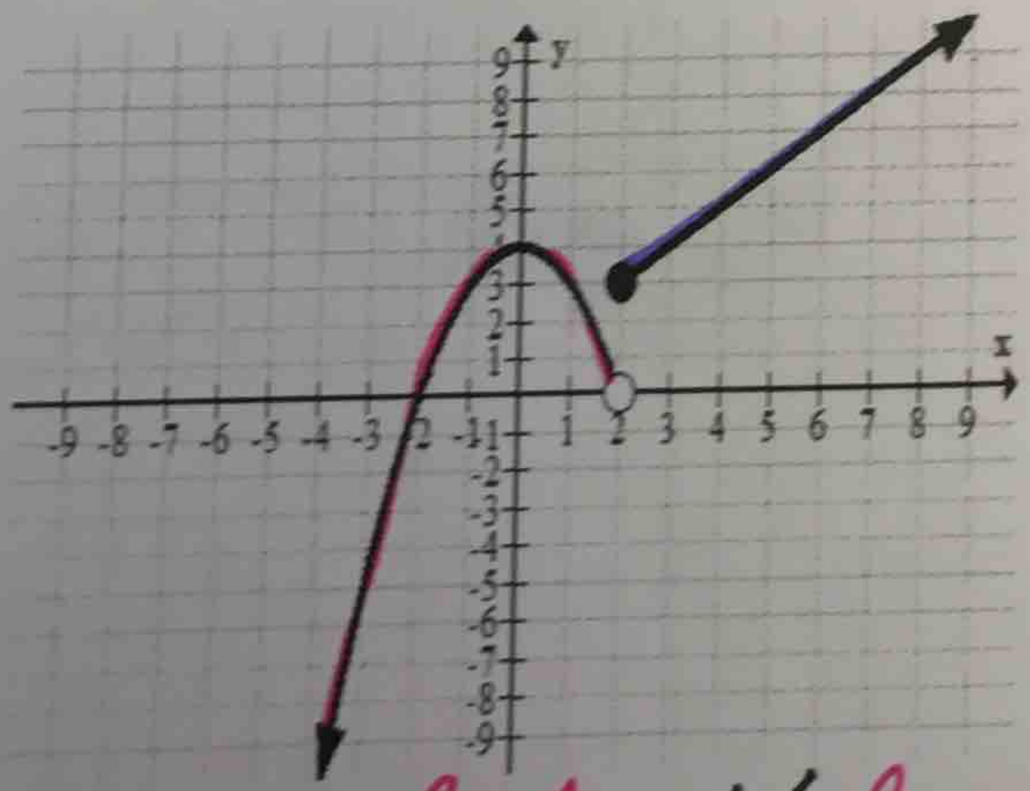


36. $f(x)=\begin{cases}x^2, & x\le 2\\ x, & x>2\end{cases}$



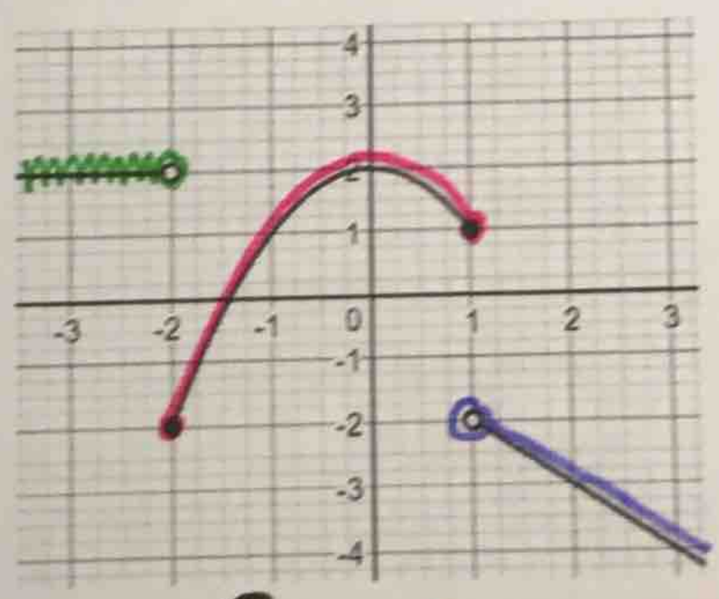
#37-38. Write a set of equations that could represent the following graphs.

37.



$f(x)=\begin{cases}-x^2+4 & x<2\\ x+1 & x\ge 2\end{cases}$

38.



$f(x)=\begin{cases}2 & x<-2\\ -x^2+2 & -2\le x\le 1\\ -x-1 & x>1\end{cases}$